Io's Thermal Output as Measured by Galileo's Near Infrared Mapping Spectrometer During Galileo's First Orbit : Ashley Gerard Davies[1], Rosaly Lopes-Gautier[1], Robert Carlson[1], William Smythe[1], Laurence Soderblom[2], and the Galileo NIMS Team ([1]Jet Propulsion Laboratory, California Institute of Technology, Pasadena, CA 91009, [2]U.S. Geological Survey, Branch of Astrogeology, Flagstaff, AZ)

The Near Infrared Mapping Spectrometer (NIMS) on Galileo has been observing Io during the Galileo tour. NIMS has a spectral range of 0.7 to 5.2 microns and is thus capable of detecting both reflected sunlight and thermal emission. The activity of individual hot spots has been monitored by NIMS and is discussed by Lopes-Gautier et al. (1997).

Recent estimates of Io's heat flow, from ground-based observations [Veeder et al. 1994] and from Voyager IRIS data [McEwen et al. 1992] have identified a group of new, large "warm" thermal anomalies, at temperatures of about 200 K and lower. It is postulated that a significant portion of Io's heat flow does not come from individual hot spots but from these "warm" areas. NIMS can measure temperatures higher than approximately 180 K and thus is capable of measuring the relative contribution of areas with temperatures >180 K to the total heat flow of Io.

During the first Galileo orbit, G1, NIMS observed most of Io's disk in darkness, using the instrument's full spectral capability (408 wavelengths). The observation was taken on June 28, 1996, at a spatial resolution of 350 km/NIMS pixel. Twelve hot spots were identified, including five not previously known (see Lopes-Gautier et al., 1997). In this paper, we discuss the additional contribution of the "warm" thermal anomalies (> 180 K) to the total thermal output from Io during this observation. We find that, at 4.8 microns, the contribution from the large "warm" areas to the total output is approximately 70%, significantly higher than that from the hot spots. NIMS will continue to monitor Io during the Galileo tour, allowing us to assess any possible temporal variations in the thermal output from these widespread "warm" areas on Io.

References: Lopes-Gautier, R., et al. (1997): Lunar Planet. Sci. Conf. XXVIII, this issue. McEwen et al. (1992): Lunar Planet. Sci. Conference XXIII, 881. Veeder et al. (1994): J. Geophys. Res. 99: 17,095-17,162.

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